

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
POU920000091US1

In Re Application Of: Schmuck et al.



Application No.

Filing Date

Examiner

Customer No.

Group Art Unit

Confirmation No.

09/618,420

07/18/2000

Kimberly N. McLean Mayo

46369

2187

9428

Invention: DETECTING WHEN TO PREFETCH INODES AND THEN PREFETCHING
INODES IN PARALLEL

RECEIVED

AUG 31 2004

Technology Center 2100

COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on June 24, 2004

The fee for filing this Appeal Brief is: \$330.00

- ☐ A check in the amount of the fee is enclosed.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 09-0463 (IBM)

Blanche E. Schiller
Signature

Dated: August 24, 2004

Blanche E. Schiller, Esq.
Reg. No. 35,670
Heslin Rothenberg Farley & Mesiti P.C.
5 Columbia Circle
Albany, NY 12203
Telephone: (518) 452-5600
Facsimile: (518) 452-5579

I certify that this document and fee is being deposited on August 24, 2004 with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Jill K. Becker
Signature of Person Mailing Correspondence

JILL K. BECKER

Typed or Printed Name of Person Mailing Correspondence

CC:



AF 120

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appellants: Schmuck et al.

Group Art Unit: 2187

Serial No.: 09/618,420

Examiner: Kimberly N. McLean Mayo

Filed: 07/18/00

Appeal No.:

RECEIVED

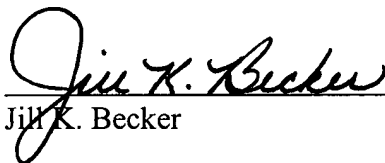
Title: DETECTING WHEN TO PREFETCH INODES AND THEN
PREFETCHING INODES IN PARALLEL

AUG 31 2004

Technology Center 2100

Certificate of Mailing

I hereby certify that this correspondence is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Mail Stop Appeal Briefs – Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 24, 2004.


Jill K. Becker

Date of Signature: August 24, 2004.

Mail Stop Appeal Briefs – Patents
Commissioner for Patents
P.O. Box 1450, Alexandria, VA 22313-1450

Brief of Appellants

Dear Sir:

This is an appeal from a final rejection, mailed February 23, 2004, rejecting claims 1-69, all the claims being considered in the above-identified application. The Brief is due within two months from the date the Notice of Appeal was received at the United States Patent and Trademark Office. Since appellants' postcard indicates that the Notice of Appeal was received on June 24, 2004, this Brief is due on or before August 24, 2004. This Brief is accompanied by a transmittal letter authorizing the charging of appellants' deposit account for payment of the requisite fee set forth in 37 C.F.R. §1.17(c).

POU920000091US1

09/18/420
08/30/2004 ZJUHR1 00000018 090463
01 FC:1402 330.00 DA

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Real Party in Interest

This application is assigned to International Business Machines Corporation by virtue of an assignment executed by the co-inventors on October 19, 2000, and recorded with the United States Patent and Trademark Office at reel 011223, frame 0126, on October 30, 2000. Therefore, the real party in interest is International Business Machines Corporation.

Related Appeals and Interferences

To the knowledge of the appellants, appellants' undersigned legal representative, and the assignee, there are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the instant appeal.

Status of Claims

This patent application was filed on July 18, 2000 with the United States Patent and Trademark Office. As filed, the application included sixty-nine (69) claims, twelve (12) of which were independent claims (i.e., claims 1, 12, 17, 22, 33, 38, 43, 45, 47, 49, 60 & 65).

In an initial Office Action, dated July 29, 2003, claims 1-3, 9, 12, 15-16, 22-24, 30, 33, 36-37, 43-45, 49-50, 57, 60 & 63-64 were rejected under 35 U.S.C. 102(b) as anticipated by Lynch (U.S. Patent No. 5,829,031; hereinafter, "Lynch"); claims 4-5, 25-26 & 52-53 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Kahle et al. (U.S. Patent No. 6,574,712; hereinafter, "Kahle"); claims 6-7, 27-28 & 54-55 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Kahle, and further in view of Ryan (U.S. Patent No. 5,367,656; hereinafter "Ryan"); claims 8, 14, 29, 35, 56 & 62 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Lopez-Aguado et al. (U.S. Patent No. 6,317,810; hereinafter, "Lopez-Aguado"); claims 10, 13, 31, 34, 59 & 61 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Ryan; claims 11, 32 & 59 were rejected under

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

35 U.S.C. 103(a) as unpatentable over Lynch in view of Ryan, and further in view of Lopez-Aguado; claims 17, 20, 38, 41, 47-48, 65 & 68 were rejected under 35 U.S.C. §103(a) as unpatentable over Lynch in view of Mason, Jr. (U.S. Patent No. 5,884,098; hereinafter, "Mason"); claims 18, 39 & 66 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason, and further in view of Ryan; claims 19, 40 & 67 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason, and further in view of Lopez-Aguado; and claims 21, 42 & 69 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason, and further in view of Ryan. In appellants' response mailed December 1, 2003, claims 1, 3, 12, 17, 22, 24, 33, 38, 43, 45, 47, 49, 51, 60 & 65 were amended.

In a second and final Office Action, dated February 23, 2004, claims 1-3, 9, 22-24, 30, 43-45, 49-50 and 57 were rejected under 35 U.S.C. 102(b) as anticipated by Lynch; claims 4-5, 25-26 and 52-53 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Kahle; claims 6-7, 27-28 and 54-55 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Kahle and further in view of Ryan; claims 8, 29 and 56 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Lopez-Aguado; claims 10, 31 and 59 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Ryan; claims 11, 32 and 59 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Ryan and further in view of Lopez-Aguado; claims 12, 15-16, 33, 36-37, 45-46, 60 and 63-64 were rejected under 35 U.S.C. 103(a) as being unpatentable over Lynch in view of newly cited art, Sollars (U.S. Patent No. 5,799,164; hereinafter "Sollars"); claims 13, 34 and 61 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch and Sollars and further in view of Ryan; claims 14, 35 and 62 are rejected under 35 U.S.C. 103(a) as unpatentable over Lynch and Sollars and further in view of Lopez-Aguado; claims 17, 20, 38, 41, 47-48, 65 and 68 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason; claims 18, 39 and 66 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason and further in view of Ryan; claims 19, 40 and 67 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason and

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

further in view of Lopez-Aguado; and claims 21, 42 and 69 were rejected under 35 U.S.C. 103(a) as unpatentable over Lynch in view of Mason and further in view of Ryan. In appellants' response mailed April 23, 2004, no amendments were made.

Appellants received an Advisory Action, dated May 26, 2004, which indicated that appellant's Response to the final Office Action did not place the application in condition for allowance.

A Notice of Appeal to the Board of Patent Appeals and Interferences was mailed on June 22, 2004. The Notice of Appeal was received at the United States Patent and Trademark Office on June 24, 2004. The status of the claims is therefore as follows:

Claims allowed – none;

Claims objected to – none;

Claims rejected – 1-69; and

Claims canceled – none.

Appellants are appealing the rejection of claims 1-69.

Appellants respectfully submit that although claims 1-69 are indicated as rejected in the Office Action Summary, there appears to be no substantive rejection in the Final Office Action for claim 58.

Status of Amendments

No claim amendment was effectuated by the Response to Final Office Action dated April 23, 2004. The claims as set out in Appendix A include all entered amendments.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Summary of Invention

One or more aspects of the present invention are directed to managing the prefetching of data of files. In one aspect, a capability is provided to detect patterns of requests for data, in which the patterns are based on user-defined attributes of files. As another aspect, a capability is provided to detect a pattern of requests for inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within the directory block. Yet another aspect includes a capability for controlling a rate of prefetching data.

More particularly, one aspect of the present invention includes a method (claim 1), system (claims 22, 43) and program storage device (claim 49) to manage the prefetching of data of files. The method includes, for instance, detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files (see, e.g., FIG. 4; page 11, lines 4-11); and prefetching data of a plurality of files, in response to the detecting indicating the pattern (see, e.g., FIG. 4; page 11, lines 12-17; FIG. 6; page 11, lines 22-27 and page 12, lines 1-5). Thus, in this aspect of appellants' claimed invention, the pattern being detected is based on one or more user-defined attributes of the multiple files, i.e., attributes of the files defined by the user. These attributes includes, for instance, the directory to contain the files (see, e.g., FIG. 3; FIG. 4; FIG. 6; page 7, lines 26-27 – page 8, lines 1-5).

In one example, the files are within a single directory (claims 3, 24 and 51). Thus, the multiple files in the detecting element of the independent claims from which these claims depend, and the plurality of files in the prefetching element are located within the same directory (see, e.g., FIG. 3; FIG. 4; page 11, lines 4-11).

Another aspect of the invention includes a method (claim 12), system (claims 33, 45), and program storage device (claim 60) to manage the prefetching of data. The method includes, for instance, controlling, subsequent to determining that prefetching of data is to occur, a rate at

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data (see, e.g., FIG. 6; page 13, lines 11-15 and 24-29); and prefetching the data of the plurality of files, in response to the controlling (see FIG. 6; page 13, lines 11-15 and 24-29). Thus, in this aspect of the invention, a rate at which data is prefetched is controlled by pacing the prefetching based upon requests for data.

In a further aspect of the invention, a method (claim 17), system (claims 38, 47), and program storage device (claim 65) to manage the prefetching of inodes associated with files of a directory is provided. The directory includes one or more directory blocks and each directory block has associated therewith zero or more files (see, e.g., FIG. 3; page 7, line 26 to page 8, line 5). The method includes, for example, detecting a pattern of requests for multiple inodes associated with multiple files of a directory block of the one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within the directory block (see FIG. 4; page 11, lines 4-11); and prefetching a plurality of inodes associated with the directory block, in response to detecting the pattern (see, e.g., FIG. 6; page 13, lines 11-15; and page 13, line 24 to page 14, line 23). Therefore, in this aspect of the invention, the pattern that is detected is based upon directory entries of multiple files being within a directory block.

Issues

1. Whether claims 1-3, 9, 22-24, 30, 43-45, 49-50 and 57 are anticipated by Lynch, U.S. Patent No. 5,829,031, and therefore, properly rejected under 35 U.S.C. 102(b).

2. Whether claims 4-5, 25-26 and 52-53 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Kahle, U.S. Patent No. 6,574,712, and therefore, properly rejected under 35 U.S.C. 103(a).

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

3. Whether claims 6-7, 27-28 and 54-55 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Kahle and further in view of Ryan, U.S. Patent No. 5,367,656, and therefore, properly rejected under 35 U.S.C. 103(a).

4. Whether claims 8, 29 and 56 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Lopez-Aguado, U.S. Patent No. 6,317,810, and therefore, properly rejected under 35 U.S.C. 103(a).

5. Whether claims 10, 31 and 59 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Ryan, and therefore, properly rejected under 35 U.S.C. 103(a).

6. Whether claims 11, 32 and 59 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Ryan and further in view of Lopez-Aguado, and therefore, properly rejected under 35 U.S.C. 103(a).

7. Whether claims 12, 15-16, 33, 36-37, 45-46, 60 and 63-64 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Sollars, U.S. Patent No. 5,799,164, and therefore, properly rejected under 35 U.S.C. 103(a).

8. Whether claims 13, 34 and 61 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch and Sollars and further in view of Ryan, and therefore, properly rejected under 35 U.S.C. 103(a).

9. Whether claims 14, 35 and 62 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch and Sollars and further in view of Lopez-Aguado, and therefore, properly rejected under 35 U.S.C. 103(a).

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

10. Whether claims 17, 20, 38, 41, 47-48, 65 and 68 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Mason, U.S. Patent No. 5,884,098, and therefore, properly rejected under 35 U.S.C. 103(a).

11. Whether claims 18, 39 and 66 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Mason and further in view of Ryan, and therefore, properly rejected under 35 U.S.C. 103(a).

12. Whether claims 19, 40 and 67 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Mason and further in view of Lopez-Aguado, and therefore, properly rejected under 35 U.S.C. 103(a).

13. Whether claims 21, 42 and 69 are obvious to one of ordinary skill in the art based on the teachings/suggestions of Lynch in view of Mason and further in view of Ryan, and therefore, properly rejected under 35 U.S.C. 103(a).

Grouping of Claims

Since each ground of rejection provides a grouping of claims, the following groups of claims are included herein:

- I. Claims 1-3, 9, 22-24, 30, 43-45, 49-51 and 57;
- II. Claims 4-5, 25-26 and 52-53;
- III. Claims 6-7, 27-28 and 54-55;
- IV. Claims 8, 29 and 56;
- V. Claims 10, 31 and 58-59;
- VI. Claims 11, 32 and 59;
- VII. Claims 12, 15-16, 33, 36-37, 45-46, 60 and 63-64;
- VIII. Claims 13, 34 and 61;

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

- IX. Claims 14, 35 and 62;
- X. Claims 17, 20, 38, 41, 47-48, 65 and 68;
- XI. Claims 18, 39 and 66;
- XII. Claims 19, 40 and 67; and
- XIII. Claims 21, 42 and 69.

As understood, the claims of one group of claims do not stand or fall with any other groups of claims. Rather, each group of claims is decided independently of the other groups of claims. The exception to this, however, is that if an independent claim is found patentable, then all claims that depend therefrom are also patentable.

Additionally, appellants respectfully submit that the claims of Group I do not stand or fall together. Rather, claims 3 and 24 (and 51) include additional features that provide a separate basis of patentability. Further, claim 45 also includes additional features that provide a separate basis of patentability.

Argument

Group I – Claims 1-3, 9, 22-24, 30, 43-45, 49-51 and 57

Claims 1-3, 9, 22-24, 30, 43-45, 49-50 and 57 stand rejected under 35 U.S.C. 102(b) as being anticipated by Lynch. Further, claim 51, which is not included in the list of rejected claims, but discussed in the substantive rejection, is included in this group and believed rejected under 35 U.S.C. 102(b). Appellants respectfully submit that the rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

It is well settled that there is no anticipation of a claim unless (1) all the same elements are (2) found in exactly the same situation and (3) are united in the same way to (4) perform the identical function. Appellants respectfully submit that Lynch fails to describe, teach or suggest

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

one or more aspects of appellants' claimed invention, and thus, Lynch does not anticipate appellants' claimed invention.

For instance, appellants respectfully submit that Lynch fails to describe, teach or suggest one or more aspects of appellants' independent claim 1. In one aspect, appellants claim a method of managing the prefetching of data of files (e.g., independent claim 1). The method includes, for instance, detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files; and prefetching data of a plurality of files, in response to the detecting indicating the pattern. Thus, in this aspect of appellants' claimed invention, the pattern being detected is based on one or more user-defined attributes of the multiple files, i.e., attributes of the files defined by the user. This is very different from the teachings of Lynch.

Lynch describes detecting a pattern of instructions that is indicative of a specific function. Lynch does not describe detecting a pattern that is based on file attributes defined by the user. File attributes are characteristics of the files (see, e.g., definition of attributes in Webster's Ninth New Collegiate Dictionary), such as file name, the directory to contain the files, etc. As claimed, these attributes are provided by the user. User defined attributes are just that – attributes defined by the user – and in this case, those attributes defined by the user are related to files that include data. This is very different from the teachings of Lynch.

In Lynch, a pattern is detected, but the pattern is not based on file attributes defined by a user. In fact, the pattern in Lynch is not based on attributes of a file at all, but instead, on occurrence of particular instructions which are indicative of a specific function (Col. 4, lines 7-10; Col. 8, line 55; Col. 10, lines 1-6). Lynch does not even mention files, much less attributes of those files in its detecting. The only mention of a file in Lynch is with respect to a register file 34 from which operands are retrieved. The register file nor any other file is described with reference to detecting a pattern. Since files are not mentioned, it follows that attributes of those

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

files, and in particular, user-defined attributes of those files, are not described, either. Thus, there is no description, teaching or suggestion in Lynch of detecting a pattern that is based on one or more user-defined attributes of the files.

The microprocessor used to detect patterns in Lynch does not use and has no knowledge of user-defined attributes of files. Instead, Lynch is limited to detecting a pattern based on analyzing address registers of instructions. At Col. 8, line 66 – Col. 9, line 9, Lynch describes, with reference to FIG. 3 thereof, the group of instructions that indicate the pattern of data accesses:

Heuristic processing unit 36 begins detection of the group of instructions at step 50 by capturing a register used as an addressing register (i.e., a register storing a value used to form the address of a memory operation). Subsequent instructions are analyzed by heuristic processing unit 36 according to steps 52, 54, and 56. If the register is found to be the target of another instruction (step 52), and the instruction modifies the register by a constant value (step 54), and the register is used in a subsequent instruction to form an address (step 56), then heuristic processing unit 36 notifies data cache 24 to begin prefetching (step 58).

Thus, the data access pattern detected in Lynch is based on analyzing registers of instructions and the formation of a memory address. This is very different from this aspect of appellants' claimed invention in which the pattern of data requests that is being detected is based on one or more attributes of multiple files that are defined by the user.

Since Lynch fails to describe, teach or suggest files in its detecting, attributes of files or detecting a pattern that is based on user-defined attributes, appellants respectfully submit that Lynch does not anticipate appellants' claimed invention. Thus, appellants respectfully submit that the §102(b) rejection of claim 1, similar independent claims, and all claims that depend therefrom in is erroneous, and appellants respectfully request reversal of this rejection.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

In addition to the above, appellants respectfully submit that claims 3, 24 and 51 have a separate basis of patentability from the other claims of Group I, and thus, do not stand or fall with the other claims of this group. For example, these claims explicitly recite that the multiple files and the plurality of files described above relative to claim 1 are within a single directory. That is, the multiple files whose data is requested in the detected pattern described above, and the plurality of files whose data is prefetched in response to detecting the pattern are located within the same directory.

In contrast, Lynch does not describe that the multiple files of the detecting a pattern and the plurality of files whose data is prefetched in response to detecting the pattern are located within a single directory. For example, as noted above, Lynch prefetches data according to the pattern established by detecting a group of instructions that access a next memory address determined by, for instance, adding a constant value to a current memory address. There is no teaching or suggestion in Lynch that the group of instructions request access to data in files of a directory at all, or that the prefetched data is associated with files of a directory, let alone that such files, if they exist, are located in a single directory, as recited by one aspect of the present invention.

In the Office Action, it is stated that the multiple files and the plurality of files being associated with a single directory is disclosed in Lynch's system that inherently includes a page table/translation table for the main memory depicted in FIG. 5 thereof. Appellants respectfully traverse the alleged equivalency between appellants' recited directory and a page table/translation table. Appellants' recited directory reflects a structure of data in files that is user-defined and visible to the user. In contrast, a page table or translation table is a structure internal to Lynch's system that allows, for instance, the tracking of the location of data in memory at a given time. These internal table structures are not visible to the user, nor are they user-defined. Moreover, the definition of a directory is very different from a table as used in the art. Again, a directory is an organizational unit to organize files. In contrast, a table does not organize files but mainly

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

holds data in a row, column format. One skilled in the art would not consider the structures equivalent. Thus, appellants respectfully submit that the §102 rejection of claims 3, 24 and 51 of this group is erroneous and submit that these claims, and other similar dependent claims, are patentable over Lynch.

Moreover, appellants respectfully submit that claim 45 also has a separate basis of patentability from the other claims of Group I, and thus, does not stand or fall with the other claims of this group. For example, claim 45 recites a first node adapted to control, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data; and at least one second node adapted to prefetch said data of said plurality of files, in response to the controlling. Thus, in this aspect of appellants' claimed invention, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched is controlled by pacing the prefetching based upon requests for data. It is explicitly admitted in the Final Office Action (see, e.g., top of page 8) that Lynch does not disclose this feature of appellants' claimed invention. Thus, Lynch does not anticipate appellants' claimed invention, and appellants respectfully submit that the §102 rejection of claim 45 is erroneous.

Based on the foregoing, appellants respectfully submit that the §102 rejection of the claims of Group I is erroneous, and appellants respectfully request reversal of the rejection.

Group II – Claims 4-5, 25-26 and 52-53

Claims 4-5, 25-26 and 52-53 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Kahle. Assuming *arguendo* that the combination of Lynch and Kahle is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Claims 4-5, 25-26 and 52-53 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the detecting element of the independent claims.

As described above, Lynch fails to describe, teach or suggest, at the very least, detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files. That is, Lynch fails to describe, teach or suggest detecting a pattern that is based on attributes of a file. Instead, Lynch teaches a pattern based on the occurrence of particular instructions indicative of a specific function. There is no description in Lynch of detecting a pattern which is based on one or more attributes of files.

Further, there is no description, teaching or suggestion in Lynch of detecting a pattern, in which the pattern is based on user-defined attributes of the files. Again, there is no detecting in Lynch of a pattern based on attributes, and thus, there is no detecting of a pattern, wherein the pattern is based on file attributes defined by the user. Instead, the pattern detected in Lynch is based on analyzing registers of instructions and the formation of a memory address and not based on one or more user-defined attributes of the multiple files.

Moreover, Lynch fails to describe, teach or suggest appellants' claimed element of wherein the detecting indicates the pattern when the detecting determines that a predefined number of requests for data could not be satisfied by reading a cache (e.g., dependent claim 4). Even the Final Office Action explicitly admits that Lynch fails to teach or suggest this claimed element (see, e.g., 5. on page 4). Thus, Kahle is relied upon. However, Kahle fails to overcome the deficiencies of Lynch.

While Kahle describes cache misses, Kahle fails to describe, teach or suggest appellants' claimed pattern. There is no description, teaching or suggestion in Kahle of a pattern based on one or more user-defined attributes of files. There is no description, teaching or suggestion of

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

detecting such a pattern. Instead, Kahle teaches the detection of a stream condition (Col. 4, lines 60-65). There is no teaching or suggestion in Kahle of detecting appellants' claimed pattern. Thus, it follows that Kahle further fails to teach or suggest appellants' claimed element "wherein said detecting indicates said pattern when...". There is no such pattern in Kahle.

Therefore, even if Kahle describes cache misses, it still does not describe appellants' claimed element of the detecting indicating a pattern which is based on one or more user-defined attributes of files, since there is no such pattern in Kahle.

Since both Lynch and Kahle fail to teach or suggest appellants' claimed pattern and/or appellants' claimed detecting, appellants respectfully submit that the combination also fails to teach or suggest these aspects of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection.

In addition to the above, appellants respectfully submit that under 35 U.S.C. 103(c), Kahle, which is owned by International Business Machines Corporation, is not valid prior art against appellants' claimed invention.

In particular, §103(c) states:

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections e, f, and g of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Thus, subject matter which was prior art under former 35 U.S.C. 103(c) via §102(e) is now disqualified as prior art against the claimed invention, for applications filed on or after November

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

29, 1999, if that subject matter and the claimed invention “were at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.”

Applying the above law to this application, which was filed on July 18, 2000, appellants respectfully submit that Kahle is not valid prior art. Kahle issued after the filing date of the present application, and is owned by International Business Machines Corporation, as indicated in the assignment records of the United States Patent and Trademark Office at Reel/Frame 010755/0854. Thus, appellants respectfully submit that the §103 rejection based on Kahle is improper.

Group III – Claims 6-7, 27-28 and 54-55

Claims 6-7, 27-28 and 54-55 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Kahle and further in view of Ryan. Assuming *arguendo* that the combination of Lynch, Kahle and Ryan is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants’ claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 6-7, 27-28 and 54-55 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define the determining of a cache miss threshold, which is utilized in detecting a pattern of requests for data, the pattern being based on one or more user-defined attributes of the files.

As described above, both Lynch and Kahle fail to describe, teach or suggest one or more aspects of the claimed invention. For instance, both Lynch and Kahle fail to teach or suggest appellants’ claimed element of detecting a pattern of requests for data of multiple files, wherein

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

the pattern is based on one or more user-defined attributes of the files. Neither Lynch nor Kahle teaches or suggests a pattern based on one or more user-defined attributes of multiple files, nor do they teach or suggest detecting such a pattern. Further, both Lynch and Kahle fail to teach or suggest appellants' claimed element of wherein the detecting indicates the claimed pattern, when a cache miss threshold has been exceeded.

Yet further, both Lynch and Kahle fail to teach or suggest the determining element of, for instance, claims 6 and 7. This is specifically admitted in the Final Office Action (see, e.g., 6. on page 4). Thus Ryan is relied upon. However, even if Ryan describes a counter of cache misses, it still fails to overcome one or more deficiencies of the other references.

For instance, Ryan fails to describe, teach or suggest appellants' claimed pattern. Further, Ryan fails to describe, teach or suggest appellants' claimed detecting a pattern of requests for data, wherein the pattern is based on one or more user-defined attributes of the multiple files. Yet further, Ryan fails to describe, teach or suggest appellants' claimed element wherein the detecting indicates said pattern, when a cache miss threshold has been exceeded. Ryan does not indicate the claimed pattern. Thus, Ryan does not overcome the deficiencies of Lynch and Kahle.

Since Ryan, Lynch and Kahle all fail to describe, teach or suggest one or more of these aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Moreover, as described above, appellants respectfully submit that Kahle is invalid prior art, and thus, appellants respectfully submit that the §103 rejection based on Kahle is improper.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Group IV – Claims 8, 29 and 56

Claims 8, 29 and 56 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Lopez-Aguado. Assuming *arguendo* that the combination of Lynch and Lopez-Aguado is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 8, 29 and 56 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the prefetching element of the independent claims.

As described above, Lynch fails to describe, teach or suggest one or more aspects of appellants' claimed invention. For instance, Lynch fails to teach or suggest appellants' claimed pattern. Further, Lynch fails to teach or suggest appellants' claimed element of detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the files.

Further, Lynch fails to describe, teach or suggest the prefetching of data of at least some files in parallel. This is explicitly admitted in the Final Office Action (see, e.g., 7. on page 5). Thus, Lopez-Aguado is relied upon. However, even if Lopez-Aguado describes prefetching in parallel, it still fails to overcome one or more deficiencies of Lynch.

For instance, Lopez-Aguado fails to describe, teach or suggest appellants' claimed pattern. Further, Lopez-Aguado fails to describe, teach or suggest appellants' claimed detecting a pattern of requests, wherein the pattern is based on one or more user-defined attributes of the multiple files. Lopez-Aguado describes a prefetch cache, but fails to address various aspects of appellants' claimed invention.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Since Lynch and Lopez-Aguado both fail to describe, teach or suggest one or more aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Group V – Claims 10, 31 and 58-59

Claims 10, 31 and 59 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Ryan. Claim 58, which does not appear to be substantively rejected, is included, for discussion, in this group. Assuming *arguendo* that the combination of Lynch and Ryan is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 10, 31 and 58-59 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the prefetching element of the independent claims.

As described above, Lynch fails to describe, teach or suggest, at the very least, detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files. Lynch fails to describe, teach or suggest a pattern based on file attributes. Lynch fails to describe, teach or suggest a pattern based on one or more user-defined attributes of files. Lynch fails to describe, teach or suggest detecting such patterns.

Further, Lynch fails to describe, teach or suggest one or more elements of claims 10, 31 and 58-59. For instance, it is specifically stated in the Final Office Action that Lynch fails to teach or suggest wherein the prefetching comprises determining whether a cache hit threshold has been reached (see, e.g., 8. on page 6). Further, it is explicitly stated in the Final Office

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Action that Lynch fails to teach or suggest wherein the prefetching comprises obtaining data associated with one or more additional files of the plurality of files, in response to reaching the cache hit threshold (see, e.g., 8. on page 6). Thus, Ryan is relied upon. However, even if Ryan describes a cache hit threshold, Ryan still fails to overcome one or more deficiencies of Lynch.

For instance, Ryan fails to describe, teach or suggest appellants' claimed pattern. Further, Ryan fails to describe, teach or suggest appellants' claimed detecting a pattern of requests for data, wherein the pattern is based on one or more user-defined attributes of multiple files. Yet further, Ryan fails to describe, teach or suggest prefetching data of a plurality of files in response to the detecting indicating the pattern of requests in which the pattern is based on one or more user-defined attributes of the multiple files.

Since Ryan and Lynch fail to describe, teach or suggest one or more of these aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Moreover, appellants respectfully submit that since claim 58 has not received a proper substantive rejection, that a prima facie case of obviousness has not been applied. Thus, claim 58 is patentable.

Group VI – Claims 11, 32 and 59

Claims 11, 32 and 59 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Ryan and further in view of Lopez-Aguado. Assuming *arguendo* that the combination of Lynch, Ryan and Lopez-Aguado is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 11, 32 and 59 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the obtaining of data that is part of the prefetching.

As described above, both Lynch and Ryan fail to describe, teach or suggest one or more aspects of the claimed invention. For instance, both Lynch and Ryan fail to teach or suggest appellants' claimed element of detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the files.

Further, both Lynch and Ryan fail to teach or suggest issuing a plurality of I/O requests to read data of at least a portion of the number of files in parallel as claimed, for instance, in dependent claim 11. This is explicitly admitted in the Final Office Action (see, e.g., 9. on page 7). Thus, Lopez-Aguado is relied upon. However, even if Lopez-Aguado describes issuing a plurality of I/O requests to read data in parallel, Lopez-Aguado still fails to overcome one or more deficiencies of Lynch and Ryan.

For instance, Lopez-Aguado fails to describe, teach or suggest appellants' claimed pattern. Further, Lopez-Aguado fails to describe, teach or suggest appellants' claimed detecting a pattern of requests for data, wherein the pattern is based on one or more user-defined attributes of the multiple files.

Since Lynch, Ryan and Lopez-Aguado all fail to describe, teach or suggest one or more of these aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Group VII – Claims 12, 15-16, 33, 36-37, 45-46, 60 and 63-64

Claims 12, 15-16, 33, 36-37, 45-46, 60 and 63-64 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Sollars. Appellants respectfully submit that the rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

This aspect of appellants' invention is directed to controlling a rate of prefetching, subsequent to determining that prefetching is to occur. For example, appellants claim a method of managing the prefetching of data (e.g., independent claim 12), in which the method includes, for instance, controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data; and prefetching the data of the plurality of files, in response to the controlling. Thus, in this aspect of appellants' claimed invention, after it is determined that prefetching of data is to occur, a rate at which data of the plurality of files is prefetched is controlled by pacing the prefetching based upon requests for data. This is very different from the teachings of Lynch and Sollars, either alone or in combination.

Assuming *arguendo* that the combination of Lynch and Sollars is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more elements of appellants' claimed invention. For instance, the combination fails to teach or suggest at least appellants' claimed element of controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data.

It is explicitly admitted in the Final Office Action (see, e.g., top of page 8) that Lynch does not disclose appellants' claimed feature of controlling, subsequent to determining that the prefetching of data is to occur, a rate at which the data is prefetched by pacing the prefetching

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

based upon requests for data. Thus, Sollars is relied upon. However, Sollars does not overcome the deficiencies of Lynch.

While Sollars teaches pacing of prefetching, the prefetching of Sollars is of instructions and not of data. Sollars describes instruction prefetch in a micro-processor (e.g., Col. 4, lines 59-67). This is in contrast to appellants' claimed invention in which the prefetching is of data and not of instructions. Further, the prefetching in Sollars is not paced based upon requests for data, but rather on how long it takes various parts of the hardware (pipelines) to process that data. Thus, Sollars fails to describe, teach or suggest pacing the prefetching of data based upon requests for data.

Since neither Lynch nor Sollars describes, teaches or suggests appellants' claimed element of controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data, appellants respectfully submit that the combination of Lynch and Sollars also fails to teach or suggest this claimed element. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the §103 rejection.

Group VIII – Claims 13, 34, and 61

Claims 13, 34 and 61 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch and Sollars and further in view of Ryan. Assuming *arguendo* that the combination of Lynch, Sollars and Ryan is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 13, 34 and 61 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

claims further define, for example, the controlling a rate at which data of a plurality of files is prefetched.

As described above, both Lynch and Sollars fail to describe, teach or suggest one or more aspects of the claimed invention. For instance, both Lynch and Sollars fail to teach or suggest appellants' claimed element of controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data.

Yet further, both Lynch and Sollars fail to teach or suggest, for instance, appellants' claimed element of wherein the controlling comprising determining whether a cache hit threshold has been reached, wherein the prefetching is performed in response to reaching said cache hit threshold. This is explicitly admitted in the Final Office Action (see, e.g., 11. on page 9). Thus, Ryan is relied upon. However, even if Ryan describes a cache hit threshold, Ryan still fails to overcome one or more deficiencies of Lynch and Sollars.

For instance, Ryan fails to describe, teach or suggest appellants' claimed element of controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data. The mere description of a cache hit threshold is not a teaching or suggestion of using the cache hit threshold in the controlling claimed by appellants. Ryan does not teach or suggest appellants' claimed controlling element.

Since Lynch, Sollars and Ryan all fail to describe, teach or suggest one or more of these aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Group IX – Claims 14, 35, and 62

Claims 14, 35, and 62 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch and Sollars and further in view of Lopez-Aguado. Assuming *arguendo* that the combination of Lynch, Sollars and Lopez-Aguado is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 14, 35 and 62 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the prefetching element of the independent claims.

As described above, both Lynch and Sollars fail to describe, teach or suggest one or more aspects of appellants' claimed invention. For instance, both Lynch and Sollars fail to teach or suggest appellants' claimed element of controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data.

Yet further, both Lynch and Sollars fail to teach or suggest, for instance, appellants' claimed element of prefetching data of at least some files of the plurality of files in parallel. This is explicitly admitted in the Final Office Action (see, e.g., 12. on page 10). Thus, Lopez-Aguado is relied upon. However, even if Lopez-Aguado teaches prefetching of data in parallel, Lopez-Aguado still fails to overcome one or more deficiencies of Lynch and Sollars.

For instance, Lopez-Aguado fails to describe, teach or suggest appellants' claimed element of controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

data. Lopez-Aguado teaches a prefetch cache, but fails to teach or suggest appellants' claimed controlling.

Since Lynch, Sollars and Lopez-Aguado all fail to describe, teach or suggest one or more of these aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Group X – Claims 17, 20, 38, 41, 47-48, 65 and 68

Claims 17, 20, 38, 41, 47-48, 65 and 68 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Mason. Appellants respectfully submit that the rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

This aspect of appellants' invention is directed to managing the prefetching of inodes associated with files of a directory. As one example, appellants claim a method of managing the prefetching of inodes associated with files of a directory, the directory including one or more directory blocks and each directory block having associated therewith zero or more files (e.g., independent claim 17). The method includes, for instance, detecting a pattern of requests for multiple inodes associated with multiple files of a directory block of the one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within the directory block; and prefetching a plurality of inodes associated with the directory block, in response to detecting the pattern. Thus, in this aspect of appellants' claimed invention, the pattern that is detected is based upon directory entries of multiple files being within a directory block. This is very different from the teachings of Lynch and Mason, either alone or in combination.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Assuming *arguendo*, that the combination of Lynch and Mason is proper, which is not being conceded herein, appellants respectfully submit that the combination of Lynch and Mason fails to teach or suggest one or more elements of appellants' claimed invention. For example, the combination fails to teach or suggest at least appellants' claimed element of detecting a pattern of requests for multiple inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within the directory block.

For example, Lynch discloses a microprocessor configured to detect a group of instructions. There is no discussion in Lynch of detecting a pattern that is based on directory entries of multiple files being within a directory block. As a matter of fact, there is no description in Lynch of directories or directory blocks. Since directories or directory blocks are not even mentioned, it follows that there is no teaching or suggestion in Lynch of detecting a pattern...wherein the pattern is based on directory entries of the multiple files being within the directory block.

Support for this rejection is indicated in the Final Office Action, in which it states, "The multiple files correspond to the files in which the data elements belong to," and "The directory block is comprised of all cache lines in the cache and thus, the detection of the pattern is based on all cache entries" (see, e.g., 13. on page 10). Appellants respectfully submit that even if the data that is being prefetched belongs to one or more files, the processing unit in Lynch has no way of knowing this. Lynch describes a detection pattern that is not related to whether or not the data is associated with files, the directory, or a directory block. Instead, the pattern of data access in Lynch is based on analyzing registers of instructions and the formation of memory addresses (e.g., an address being repeatedly incremented by a constant value to obtain other addresses; see Col. 9, lines 14-23). This is very different from a pattern based on directory entries of multiple files being with a directory block, as recited by one or more claims presented herewith.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Further, appellants respectfully disagree that a cache is equivalent to a directory block. As known in the art and as described in appellants' specification (see, e.g., page 8, lines 1-5 and FIG. 3), a directory block is a block of information in a directory. A directory is defined as an organizational unit or container used to organize files into a hierarchical structure (see, e.g., Webopedia Computer Dictionary at www.pc.webopedia.com/term/d/directory.html). In contrast to a directory, a cache is just a place to store data that does not have the hierarchical structure of a directory. Thus, appellants respectfully submit that a directory is much different than a cache. Since Lynch fails to describe, teach or suggest a directory, a directory block, or detecting a pattern that is based on directory entries of multiple files being within a directory block, appellants respectfully submit that their claimed invention is not taught or suggested by Lynch.

Mason fails to overcome the above described deficiencies of Lynch. Mason describes a disk drive array controller that allows prefetching of disk drive metadata used exclusively by the disk array controller and other disk subsystem components for the controller maintenance of the disk array system. The metadata in Mason includes parity information (e.g., parity blocks) (Col. 1, lines 41-47). The prefetching of metadata in Mason is quite different from the inode prefetch management technique of one aspect of appellants' claimed invention.

Like Lynch, Mason fails to even mention a directory much less appellants' claimed element of detecting a pattern in which the pattern is based on directory entries of the multiple files being within a directory block. In contrast, Mason's prefetch of metadata is based on the likelihood of one command following another, without regard to whether the metadata is associated with multiple files of a directory block. For example, since a write command (which involves parity blocks) often follows a read of a block, Mason prefetches a parity block into a cache to save time and enhance performance of input/output (I/O) processing (see Col. 7, lines 54-63). This parity block reflects the internal structure of the storage system in Mason, and is not user-defined or visible to the user. Thus, this parity block prefetching in Mason is based on internal system structure, rather than on files being within the same directory, let alone on

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

directory entries of those files being within a directory block, as recited by one or more claims presented herewith.

The Office Action cites Col. 4, lines 30-41; Col. 7, lines 53-63; and Col. 9, lines 32-39 of Mason as teaching prefetching of metadata. These sections of Mason describe a prefetch technique that includes prefetching metadata (e.g., parity information/blocks) into a backend cache coordinated with a front end cache, in parallel with other operations, and in conjunction with a write command because it is likely to follow a read of a block. Although prefetching of metadata is described in these sections of Mason, they do not teach or suggest prefetching in response to detecting the pattern described above. Again, it is the detection of the pattern based on the above-noted directory entries that is not taught or suggested by Mason.

Since both Lynch and Mason fail to teach or suggest appellants' claimed element of detecting a pattern of requests for multiple inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within the directory block, appellants respectfully submit that the combination also fails to teach or suggest this claimed element. Therefore, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Group XI – Claims 18, 39, and 66

Claims 18, 39 and 66 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Mason and further in view of Ryan. Assuming *arguendo* that the combination of Lynch, Mason and Ryan is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Claims 18, 39 and 66 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the detecting element of the independent claims, as well as a counter and cache miss threshold associated with a directory block.

As described above, both Lynch and Mason fail to describe, teach or suggest a directory. Further, both Lynch and Mason fail to describe, teach or suggest detecting a pattern in which the pattern is based on directory entries of the multiple files being within a directory block.

Moreover, both Lynch and Mason fail to teach or suggest a counter associated with a directory block and a cache miss threshold, as well as other features of the dependent claims. This is explicitly admitted in the Final Office Action (see, e.g., 14. on page 12). Thus, Ryan is relied upon. However, even if Ryan describes a cache miss threshold, Ryan still fails to overcome one or more deficiencies of Lynch and Mason.

For instance, Ryan fails to describe, teach or suggest appellants' claimed element of detecting a pattern of requests for multiple inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within the directory block. Such a pattern or detection of such a pattern is not discussed in Ryan. Therefore, it follows that although Ryan may have a cache miss threshold, Ryan does not describe using a cache miss threshold to determine whether the claimed pattern exists. There is no such pattern in Ryan.

Since Lynch, Mason and Ryan all fail to describe, teach or suggest one or more aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Group XII – Claims 19, 40, and 67

Claims 19, 40 and 67 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Mason and further in view of Lopez-Aguado. Assuming *arguendo* that the combination of Lynch, Mason and Lopez-Aguado is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 19, 40 and 67 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims further define, for example, the prefetching of the independent claims.

As described above, both Lynch and Mason fail to describe, teach or suggest one or more aspects of appellants' claimed invention. For instance, both Lynch and Mason fail to teach or suggest appellants' claimed element of detecting a pattern of requests for multiple inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within a directory block. There is no discussion in either reference of this claimed pattern or of detecting such a pattern.

Yet further, both Lynch and Mason fail to teach or suggest, for instance, appellants' claimed element of prefetching at least a portion of the plurality of inodes in parallel. This is explicitly admitted in the Final Office Action (see, e.g., 15. on page 13). Thus, Lopez-Aguado is relied upon. However, even if Lopez-Aguado describes parallel prefetching, Lopez-Aguado still fails to overcome one or more deficiencies of Lynch and Mason.

For instance, Lopez-Aguado fails to describe, teach or suggest appellants' claimed element of detecting a pattern of requests for multiple inodes associated with multiple files of a

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

directory block, wherein the pattern is based on directory entries of the multiple files being within the directory block. Further, since Lopez-Aguado fails to teach or suggest this detecting element, it follows that it fails to teach or suggest prefetching inodes, in response to the claimed detecting. There is no such detecting. Yet further, it follows that Lopez-Aguado fails to teach or suggest prefetching in parallel, in response to the claimed detecting. Again, there is no detecting, as claimed by appellants.

Since Lynch, Mason and Lopez-Aguado all fail to describe, teach or suggest one or more of these aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that this §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Group XIII – Claims 21, 42 and 69

Claims 21, 42 and 69 stand rejected under 35 U.S.C. 103(a) as being obvious over Lynch in view of Mason and further in view of Ryan. Assuming *arguendo* that the combination of Lynch, Mason and Ryan is proper, which is not being conceded herein, appellants respectfully submit that the combination of the references fails to teach or suggest one or more features of appellants' claimed invention. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of this rejection for the reasons below.

Claims 21, 42 and 69 are dependent claims, and therefore, include all of the features of the independent claims from which they depend, as well as their own additional features. These claims recite, for example, initiating the prefetching of one or more inodes associated with another directory block, in which the initiating includes determining whether a cache hit threshold has been met.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

As described above, both Lynch and Mason fail to describe, teach or suggest a directory or detecting a pattern in which the pattern is based on directory entries of the multiple files being within a directory block.

Further, both Lynch and Mason fail to teach or suggest a counter associated with a directory block and a cache hit threshold, as well as other features of the dependent claims. This is explicitly admitted in the Final Office Action (see, e.g., 16. on page 13). Thus, Ryan is relied upon. However, even if Ryan describes a cache hit threshold, Ryan still fails to overcome one or more deficiencies of Lynch and Mason.

For instance, Ryan fails to describe, teach or suggest appellants' claimed element of detecting a pattern of requests for multiple inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within the directory block.

Since Lynch, Mason and Ryan all fail to describe, teach or suggest one or more aspects of appellants' claimed invention, the combination also fails to teach or suggest one or more of these elements. Thus, appellants respectfully submit that the §103 rejection of the claims of this group is erroneous and respectfully request reversal of the rejection.

Conclusion

Appellants respectfully request reversal of the §102 and §103 rejections of claims 1-69 set forth in the Final Office Action. Appellants respectfully submit that their claimed invention is not anticipated by Lynch nor is it obvious to one of ordinary skill in the art based upon Lynch, Kahle, Ryan, Lopez-Aguado, Sollars, and/or Mason, either alone or in combination.

Appellants respectfully submit that the base reference, Lynch, fails to describe, teach or suggest one or more aspects in each of the independent claims. Further, the secondary references

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

do not overcome the deficiencies of Lynch. Therefore, each of the pending claims is patentable over Lynch, either alone, or in combination with any of the other applied references.

As one example, appellants respectfully submit that none of the applied references, either alone or in combination, describes, teaches or suggests appellants' claimed detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files. There is no discussion in any of the applied references of a pattern that is based on one or more user-defined attributes of multiple files. Further, there is no discussion in any of the applied references of detecting such a pattern.

As a further example, appellants respectfully submit that none of the applied references, either alone or in combination, describes, teaches or suggests detecting a pattern of requests for multiple inodes associated with multiple files of a directory block, wherein the pattern is based on directory entries of the multiple files being within that directory block; and prefetching a plurality of inodes associated with the directory block, in response to detecting the pattern. Again, none of the applied references describes, teaches or suggests a pattern based on directory entries of the multiple files being within the directory block, nor do the applied references describe, teach or suggest detecting such a pattern. Further, the applied references fail to describe, teach or suggest prefetching inodes within the directory block, in response to detecting such a pattern.

As yet a further example, appellants respectfully submit that none of the applied references, either alone or in combination, describes, teaches or suggests controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data. This is not taught in any of the references.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Appellants respectfully submit that the secondary references, which have not even, in most cases, been applied to aspects of the independent claims, do not overcome the deficiencies of the base reference, Lynch.

For all of the above reasons, appellants allege error in rejecting their claims as anticipated or obvious based on the applied art. Accordingly, reversal of all rejections is respectfully requested.

Blanche E. Schiller
Blanche E. Schiller
Attorney for Appellants
Registration No.: 35,670

Dated: August 24, 2004.

HESLIN ROTHENBERG FARLEY & MESITI P.C.
5 Columbia Circle
Albany, New York 12203-5160
Telephone: (518) 452-5600
Facsimile: (518) 452-5579

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

Appendix A

1. A method of managing the prefetching of data of files, said method comprising:

detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files; and

prefetching data of a plurality of files, in response to said detecting indicating said pattern.
2. The method of claim 1, wherein said data comprises meta data.
3. The method of claim 1, wherein said multiple files and said plurality of files are within a single directory.
4. The method of claim 1, wherein said detecting indicates said pattern when said detecting determines that a predefined number of requests for data could not be satisfied by reading a cache.
5. The method of claim 1, wherein said detecting comprises determining whether a cache miss threshold has been exceeded, wherein said detecting indicates said pattern when said cache miss threshold has been exceeded.
6. The method of claim 5, wherein said determining comprises comparing a counter of cache misses that occurred within a preselected time interval to said cache miss threshold to determine whether said cache miss threshold has been exceeded.
7. The method of claim 6, wherein said counter and said cache miss threshold are associated with a directory block of a directory of files, said directory of files comprising said multiple files and said plurality of files, and said directory of files comprising one or more directory blocks.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

8. The method of claim 1, wherein said prefetching comprises prefetching data of at least some files of said plurality of files in parallel.

9. The method of claim 1, wherein said prefetching comprises prefetching data at an average rate that substantially matches a speed of requests for data.

10. The method of claim 1, wherein said prefetching comprises:

obtaining data associated with a number of files of said plurality of files;

determining whether a cache hit threshold has been reached; and

obtaining data associated with one or more additional files of said plurality of files, in response to reaching said cache hit threshold.

11. The method of claim 10, wherein said obtaining data associated with said number of files comprises issuing a plurality of I/O requests to read data of at least a portion of said number of files in parallel.

12. A method of managing the prefetching of data, said method comprising:

controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data; and

prefetching said data of said plurality of files, in response to said controlling.

13. The method of claim 12, wherein said controlling comprises determining whether a cache hit threshold has been reached, wherein said prefetching is performed in response to reaching said cache hit threshold.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

14. The method of claim 12, wherein said prefetching comprises prefetching data of at least some files of said plurality of files in parallel.

15. The method of claim 12, further comprising detecting a pattern of requests for data of multiple files, wherein said pattern indicates prefetching is to occur.

16. The method of claim 12, wherein said data comprises meta data.

17. A method of managing the prefetching of inodes associated with files of a directory, said directory comprising one or more directory blocks and each directory block having associated therewith zero or more files, said method comprising:

detecting a pattern of requests for multiple inodes associated with multiple files of a directory block of said one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within said directory block; and

prefetching a plurality of inodes associated with said directory block, in response to detecting said pattern.

18. The method of claim 17, wherein said directory block has associated therewith a counter and a cache miss threshold, said counter representing a number of inodes associated with said directory block that were requested within a preselected amount of time and were not found in a cache, and wherein said detecting comprises comparing said counter to said cache miss threshold to determine whether said pattern exists.

19. The method of claim 17, wherein said prefetching comprises prefetching at least a portion of said plurality of inodes in parallel.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

20. The method of claim 17, further comprising initiating the prefetching of one or more inodes associated with another directory block of said directory, wherein said initiating is in response to requests for inodes of said directory.

21. The method of claim 20, wherein said initiating comprises determining whether a cache hit threshold has been reached, wherein said prefetching of one or more inodes associated with said another directory block is initiated when said cache hit threshold is reached.

22. A system of managing the prefetching of data of files, said system comprising:

means for detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files; and

means for prefetching data of a plurality of files, in response to said means for detecting indicating said pattern.

23. The system of claim 22, wherein said data comprises meta data.

24. The system of claim 22, wherein said multiple files and said plurality of files are within a single directory.

25. The system of claim 22, wherein said means for detecting indicates said pattern when said means for detecting determines that a predefined number of requests for data could not be satisfied by reading a cache.

26. The system of claim 22, wherein said means for detecting comprises means for determining whether a cache miss threshold has been exceeded, wherein said means for detecting indicates said pattern when said cache miss threshold has been exceeded.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

27. The system of claim 26, wherein said means for determining comprises means for comparing a counter of cache misses that occurred within a preselected time interval to said cache miss threshold to determine whether said cache miss threshold has been exceeded.

28. The system of claim 27, wherein said counter and said cache miss threshold are associated with a directory block of a directory of files, said directory of files comprising said multiple files and said plurality of files, and said directory of files comprising one or more directory blocks.

29. The system of claim 22, wherein said means for prefetching comprises means for prefetching data of at least some files of said plurality of files in parallel.

30. The system of claim 22, wherein said means for prefetching comprises means for prefetching data at an average rate that substantially matches a speed of requests for data.

31. The system of claim 22, wherein said means for prefetching comprises:

means for obtaining data associated with a number of files of said plurality of files;

means for determining whether a cache hit threshold has been reached; and

means for obtaining data associated with one or more additional files of said plurality of files, in response to reaching said cache hit threshold.

32. The system of claim 31, wherein said means for obtaining data associated with said number of files comprises means for issuing a plurality of I/O requests to read data of at least a portion of said number of files in parallel.

33. A system of managing the prefetching of data, said system comprising:

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

means for controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data; and

means for prefetching said data of said plurality of files, in response to the controlling.

34. The system of claim 33, wherein said means for controlling comprises means for determining whether a cache hit threshold has been reached, wherein prefetching is performed in response to reaching said cache hit threshold.

35. The system of claim 33, wherein said means for prefetching comprises means for prefetching data of at least some files of said plurality of files in parallel.

36. The system of claim 33, further comprising means for detecting a pattern of requests for data of multiple files, wherein said pattern indicates prefetching is to occur.

37. The system of claim 33, wherein said data comprises meta data.

38. A system of managing the prefetching of inodes associated with files of a directory, said directory comprising one or more directory blocks and each directory block having associated therewith zero or more files, said system comprising:

means for detecting a pattern of requests for multiple inodes associated with multiple files of a directory block of said one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within said directory block; and

means for prefetching a plurality of inodes associated with said directory block, in response to detecting said pattern.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

39. The system of claim 38, wherein said directory block has associated therewith a counter and a cache miss threshold, said counter representing a number of inodes associated with said directory block that were requested within a preselected amount of time and were not found in a cache, and wherein said means for detecting comprises means for comparing said counter to said cache miss threshold to determine whether said pattern exists.

40. The system of claim 38, wherein said means for prefetching comprises means for prefetching at least a portion of said plurality of inodes in parallel.

41. The system of claim 38, further comprising means for initiating the prefetching of one or more inodes associated with another directory block of said directory, wherein the initiating is in response to requests for inodes of said directory.

42. The system of claim 41, wherein said means for initiating comprises means for determining whether a cache hit threshold has been reached, wherein the prefetching of one or more inodes associated with said another directory block is initiated when said cache hit threshold is reached.

43. A system of managing the prefetching of data of files, said system comprising:

a first node adapted to detect a pattern of requests for data of multiple files wherein the pattern is based on one or more user-defined attributes of the multiple files; and

at least one second node adapted to prefetch data of a plurality of files, in response to the detecting indicating said pattern.

44. The system of claim 43, wherein said at least one second node includes said first node.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

45. A system of managing the prefetching of data, said system comprising:

a first node adapted to control, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data; and

at least one second node adapted to prefetch said data of said plurality of files, in response to the controlling.

46. The system of claim 45, wherein said at least one second node includes said first node.

47. A system of managing the prefetching of inodes associated with files of a directory, said directory comprising one or more directory blocks and each directory block having associated therewith zero or more files, said system comprising:

a first node adapted to detect a pattern of requests for multiple inodes associated with multiple files of a directory block of said one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within said directory block; and

at least one second node adapted to prefetch a plurality of inodes associated with said directory block, in response to detecting said pattern.

48. The system of claim 47, wherein said at least one second node includes said first node.

49. At least one program storage device readable by a machine, tangibly embodying at least one program of instructions executable by the machine to perform a method of managing the prefetching of data of files, said method comprising:

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

detecting a pattern of requests for data of multiple files, wherein the pattern is based on one or more user-defined attributes of the multiple files; and

prefetching data of a plurality of files, in response to said detecting indicating said pattern.

50. The at least one program storage device of claim 49, wherein said data comprises meta data.

51. The at least one program storage device of claim 49, wherein said multiple files and said plurality of files are within a single directory.

52. The at least one program storage device of claim 49, wherein said detecting indicates said pattern when said detecting determines that a predefined number of requests for data could not be satisfied by reading a cache.

53. The at least one program storage device of claim 49, wherein said detecting comprises determining whether a cache miss threshold has been exceeded, wherein said detecting indicates said pattern when said cache miss threshold has been exceeded.

54. The at least one program storage device of claim 53, wherein said determining comprises comparing a counter of cache misses that occurred within a preselected time interval to said cache miss threshold to determine whether said cache miss threshold has been exceeded.

55. The at least one program storage device of claim 54, wherein said counter and said cache miss threshold are associated with a directory block of a directory of files, said directory of files comprising said multiple files and said plurality of files, and said directory of files comprising one or more directory blocks.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

56. The at least one program storage device of claim 49, wherein said prefetching comprises prefetching data of at least some files of said plurality of files in parallel.

57. The at least one program storage device of claim 49, wherein said prefetching comprises prefetching data at an average rate that substantially matches a speed of requests for data.

58. The at least one program storage device of claim 49, wherein said prefetching comprises:

obtaining data associated with a number of files of said plurality of files;

determining whether a cache hit threshold has been reached; and

obtaining data associated with one or more additional files of said plurality of files, in response to reaching said cache hit threshold.

59. The at least one program storage device of claim 58, wherein said obtaining data associated with said number of files comprises issuing a plurality of I/O requests to read data of at least a portion of said number of files in parallel.

60. At least one program storage device readable by a machine, tangibly embodying at least one program of instructions executable by the machine to perform a method of managing the prefetching of data, said method comprising:

controlling, subsequent to determining that prefetching of data is to occur, a rate at which data of a plurality of files is prefetched by pacing the prefetching based upon requests for data; and

prefetching said data of said plurality of files, in response to said controlling.

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

61. The at least one program storage device of claim 60, wherein said controlling comprises determining whether a cache hit threshold has been reached, wherein said prefetching is performed in response to reaching said cache hit threshold.

62. The at least one program storage device of claim 60, wherein said prefetching comprises prefetching data of at least some files of said plurality of files in parallel.

63. The at least one program storage device of claim 60, wherein said method further comprises detecting a pattern of requests for data of multiple files, wherein said pattern indicates prefetching is to occur.

64. The at least one program storage device of claim 60, wherein said data comprises meta data.

65. At least one program storage device readable by a machine, tangibly embodying at least one program of instructions executable by the machine to perform a method of managing the prefetching of inodes associated with files of a directory, said directory having associated therewith one or more directory blocks and each directory block comprising zero or more files, said method comprising:

detecting a pattern of requests for multiple inodes associated with multiple files of a directory block of said one or more directory blocks, wherein the pattern is based on directory entries of the multiple files being within said directory block; and

prefetching a plurality of inodes associated with said directory block, in response to detecting said pattern.

66. The at least one program storage device of claim 65, wherein said directory block has associated therewith a counter and a cache miss threshold, said counter representing a number of inodes associated with said directory block that were requested within a preselected

Appellants: Schmuck et al.
Serial No.: 09/618,420
Filing Date: 07/18/00

amount of time and were not found in a cache, and wherein said detecting comprises comparing said counter to said cache miss threshold to determine whether said pattern exists.

67. The at least one program storage device of claim 65, wherein said prefetching comprises prefetching at least a portion of said plurality of inodes in parallel.

68. The at least one program storage device of claim 65, wherein said method further comprises initiating the prefetching of one or more inodes associated with another directory block of said directory, wherein said initiating is in response to requests for inodes of said directory.

69. The at least one program storage device of claim 68, wherein said initiating comprises determining whether a cache hit threshold has been reached, wherein said prefetching of one or more inodes associated with said another directory block is initiated when said cache hit threshold is reached.